

2.488Gbps Downstream/1.244Gbps Upstream GPON ONU Transceiver



Description

DELTA's high capacity GPON ONU transceiver module is designed for Passive Optical Network (PON) application, 2.488Gbps downstream and 1.244Gbps upstream. It is compliant with ITU-T G.984.2 standard.

The GPON ONU transceiver is provided with SC pigtail connector complied with SC connector industry standard.

The module consists 1310nm un-cool DFB laser, InGaAs/InP APD, Preamplifier and WDM filter in a high-integrated optical sub-assembly, and it receives up to 2.488Gbps of continuous data at 1490nm, and transmits 1.244Gbps of burst-mode data at 1310nm.

FEATURES

- RoHS compliant
- 2x5 pin SFF package with SC/APC pigtail fiber
- Supports asymmetrical 2488 Mbps downstream and 1244 Mbps upstream
- 1310nm Transmitter, 1490nm Receiver
- Integrated with WDM filter to cut 1550nm and 1650nm optical signal off for Voice/Data FTTx ONT/ONU applications
- Single +3.3V power supply
- LVPECL electrical signal interface, LVTTTL shutdown input and alarm output
- Bellcore GR-468 compliant
- Laser class 1 product which comply with the requirements of IEC 60825-1 and IEC 60825-2

Application

- ITU-T G.984.2 compliant
- GPON ONU Class B+
- Burst mode application
- FTTx WDM Broadband Access

Performance

- OPGP-34-A4B3RA data link up to 20km in 9/125um single mode fiber.
- The pre-bias time is less than 16bits.

1. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40		85	°C	
Storage Ambient Humidity	HA	5		95	%	
Power Supply Voltage	V _{CC}	0		5	V	
Signal Input Voltage		-0.3		V _{CC} +0.3	V	
Optical Input Power (Peak)				7	dBm	
Lead Soldering Temperature	T _{SOLD}			260	°C	
Lead Soldering Time	t _{SOLD}			10	sec	

2. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Ambient Temperature	T _A	-5		70	°C	
Ambient Humidity	HA	5		90	%	Non-condensing
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}			350	mA	
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz
Data Rate of Transmitter			1244.16		Mbps	
Data Rate of Receiver			2488.32		Mbps	
Line Code		Scrambled NRZ				
Transmission Distance				20	km	

3. Specification of Transmitter

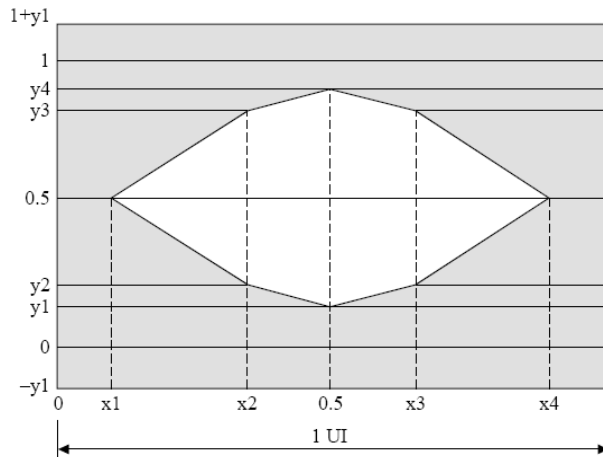
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Launched Power	P _O	+1		+5	dBm	B.O.L -Note (1)
		+0.5		+5	dBm	E.O.L -Note (1)
Optical Extinction Ratio	ER	10			dB	
Center Wavelength	λ _c	1260	1310	1360	nm	DFB Laser
-20dB Spectrum Width (RMS)	σ		0.3	1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter OFF Output Power	P _{Off}			-45	dBm	
Optical Rise/Fall Time	t _r /t _f			200	ps	Note (2)
Tx Enable	T _{on}			16	bits	12.8ns
Tx Disable	T _{off}			16	bits	12.8ns
Transmitter Reflectance				-6	dB	
Tolerance to the Transmitter's incident Light Power		-15			dB	
Jitter Generation				0.33	Ulp-p	4KHz~10MHz
Output Eye Mask		Compliant with ITU-T G.984.2				Note (3)
ORL of ODN at Oru and Ord		32			dB	

Note (1). Launched power (avg.) is power coupled into a single mode fiber.

B.O.L = Begin of Life, E.O.L = End of Life

Note (2). These are unfiltered 20-80% values.

Note (3). Transmitter eye mask definition



Upstream Bit rate (Mbps)	1244.16Mbit/s
x1/x4	0.22/0.78
x2/x3	0.40/0.60
y1/y4	0.17/0.83
y2/y3	0.20/0.80

4. Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1480		1500	nm	APD
Receiver Sensitivity	P_{IN}			-28	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	-8			dBm	
Signal Detect- Assert Power	P_A			-28	dBm	
Signal Detect- Deassert Power	P_D	-38			dBm	Note (2)
Signal Detect- Hysteresis	$P_A - P_D$	0.5	2	4	dB	
Consecutive Identical Bit Immunity		72			bits	
Optical Crosstalk from Internal Laser	X_{opt}			-47	dB	
Polarization Dependent Loss				0.5	dB	
Tolerance to reflected optical power				10	dB	
Receiver Reflectance				-20	dB	Note (3)
Output Data Rise/Fall time	t_r/t_f			150	ps	Note (4)
Optical Isolation of Receiver		40			dB	

Note (1). Measured with 1490nm, ER=10dB; BER = $<10^{-10}$ @ PRBS = $2^{23}-1$ NRZ without FEC

Note (2). When Signal Detect Deasserted, the data output is Low-level (fixed)

Note (3). When the terminal is viewed from the optical path, the reflection toward the optical path of the optical signal with a central wavelength of 1480nm to 1500nm transmitted to terminal.

Note (4). These are 20%~80% values

5. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I _{CC}			A	mA	Note (1)
Differential line input Impedance	R _{IN}	80	100	120	Ohm	
Differential Data Input Swing	V _{DT}	400		2000	mV _{p-p}	LVPECL
Data Input Voltage- High	V _{IH} -V _{CC}	-1.165		-0.880	V	
Data Input Voltage- Low	V _{IL} -V _{CC}	-1.810		-1.475	V	
BiasCNT Input Voltage- High	V _{BCNTH}	2		V _{CC}		LVTTTL
BiasCNT Input Voltage- Low	V _{BCNTL}	0		0.8		
Receiver						
Total Supply Current	I _{CC}			B	mA	Note (1)
Differential Data Output Swing	V _{DR}	700		900	mV _{p-p}	Note (2)
Signal Detect Output Voltage-High	V _{LOSH}	2		V _{CC} +0.3	V	LVTTTL
Signal Detect Output Voltage-Low	V _{LOSL}	0		0.8	V	

Note (1). A (TX)+ B (RX) = 350mA (Not include termination circuit)

Note (2). Internally AC coupled, but requires a 100Ohm differential termination at or internal to Serializer/Deserializer.

6. Transmitter Burst Mode Timing Characteristics

VccT	BiasCNT	Data Input	Optical Output
VccT < 3.135V	X	X	OFF
VccT > 3.135V	Low	X	OFF
	High	No	Other
		Yes	Laser bias and modulation signal output

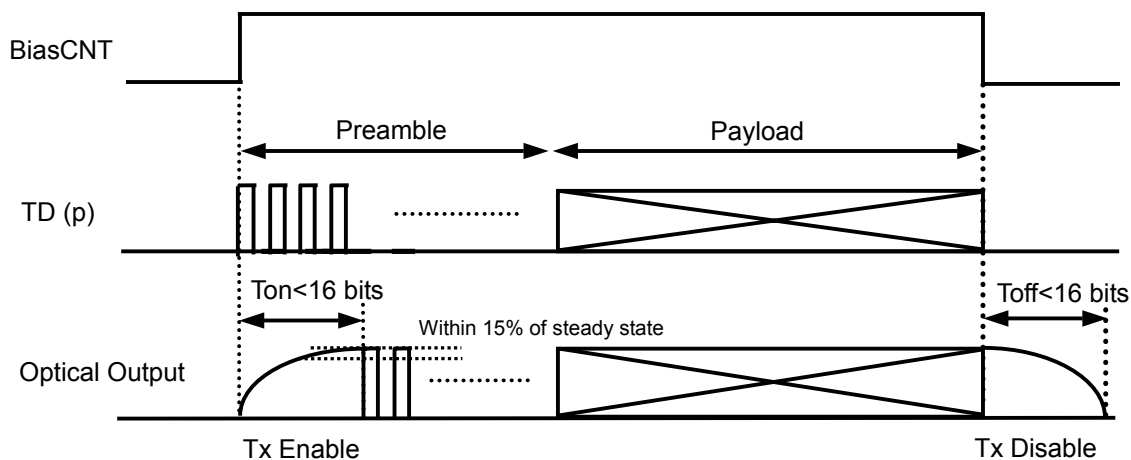
X = Don't care

Other = Less than +8dBm (peak)

High = Logic high level, Low = logic low level

No = Data NOT Present, Yes = Data Present,

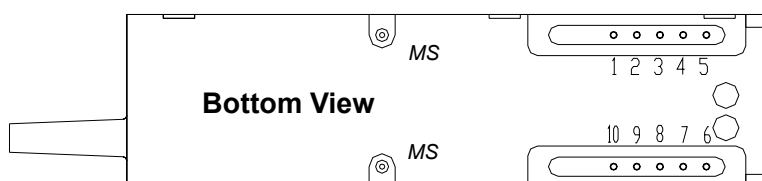
OFF = Optical Power is less than -45dBm



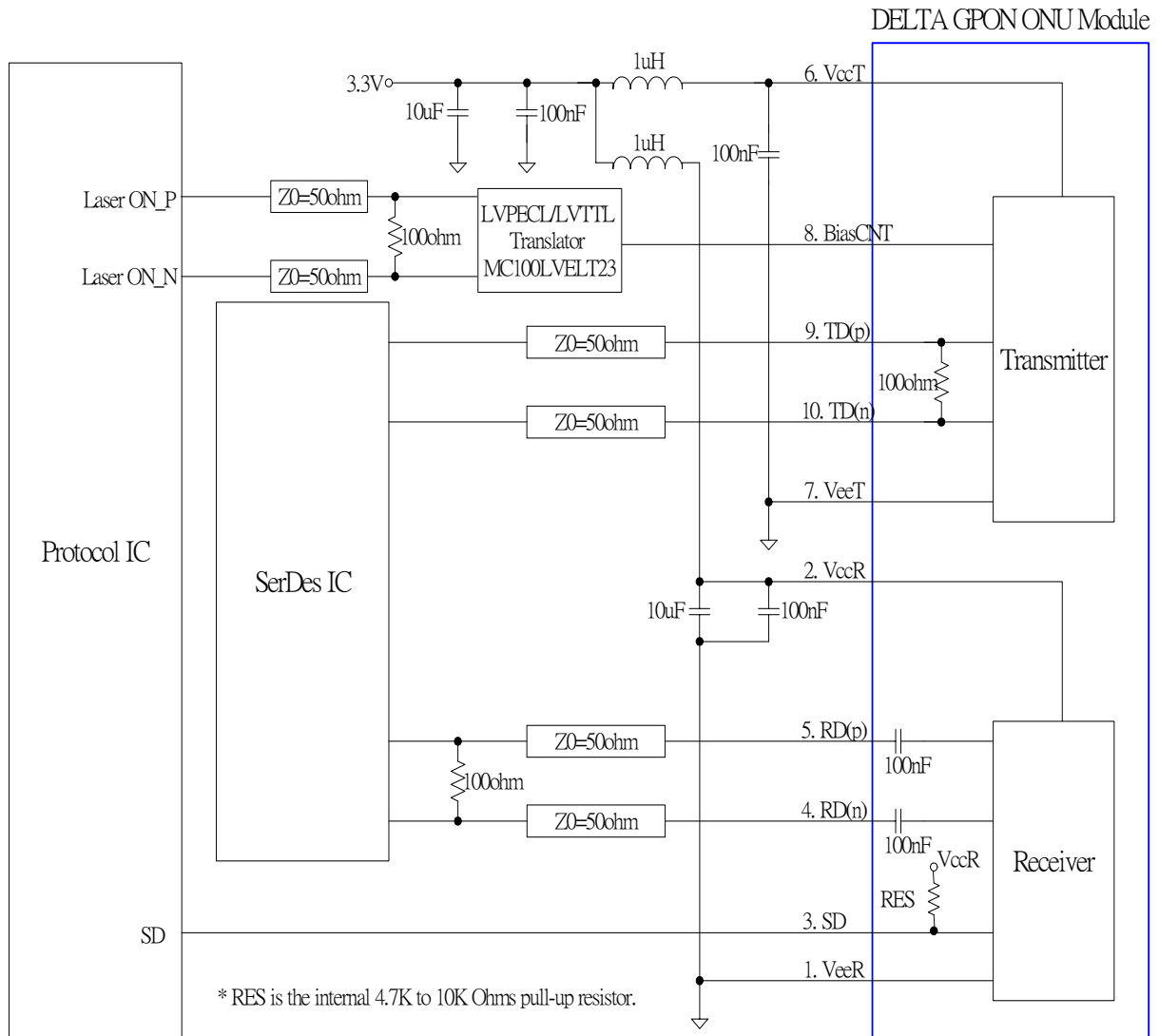
Ton/Toff Time Definition

7. Pin Description

Tx/Rx	Pin No.	I/O	Pin Name	Description
Rx	1		VeeR	Receiver Ground
	2		VccR	+3.3V Receiver Power Supply
	3	O	SD	Normal Optical Input indicated by logic "High", and No Optical Input indicated by logic "Low". (LVTTL)
	4	O	RD(n)	Inverted Receiver Data Output (AC-Coupled CML output)
	5	O	RD(p)	Non-Inverted Receiver Data Output (AC-Coupled CML output)
Tx	6		VccT	+3.3V Transmitter Power Supply
	7		VeeT	Transmitter Ground
	8	I	BiasCNT	Positive pulse which control the ONU burst mode operation
	9	I	TD(p)	Non-Inverted Transmitter Data Input (DC-Coupled LVPECL input)
	10	I	TD(n)	Inverted Transmitter Data Input (DC-Coupled LVPECL input)
			MS	Mounting studs/ connect this pin to Chassis ground

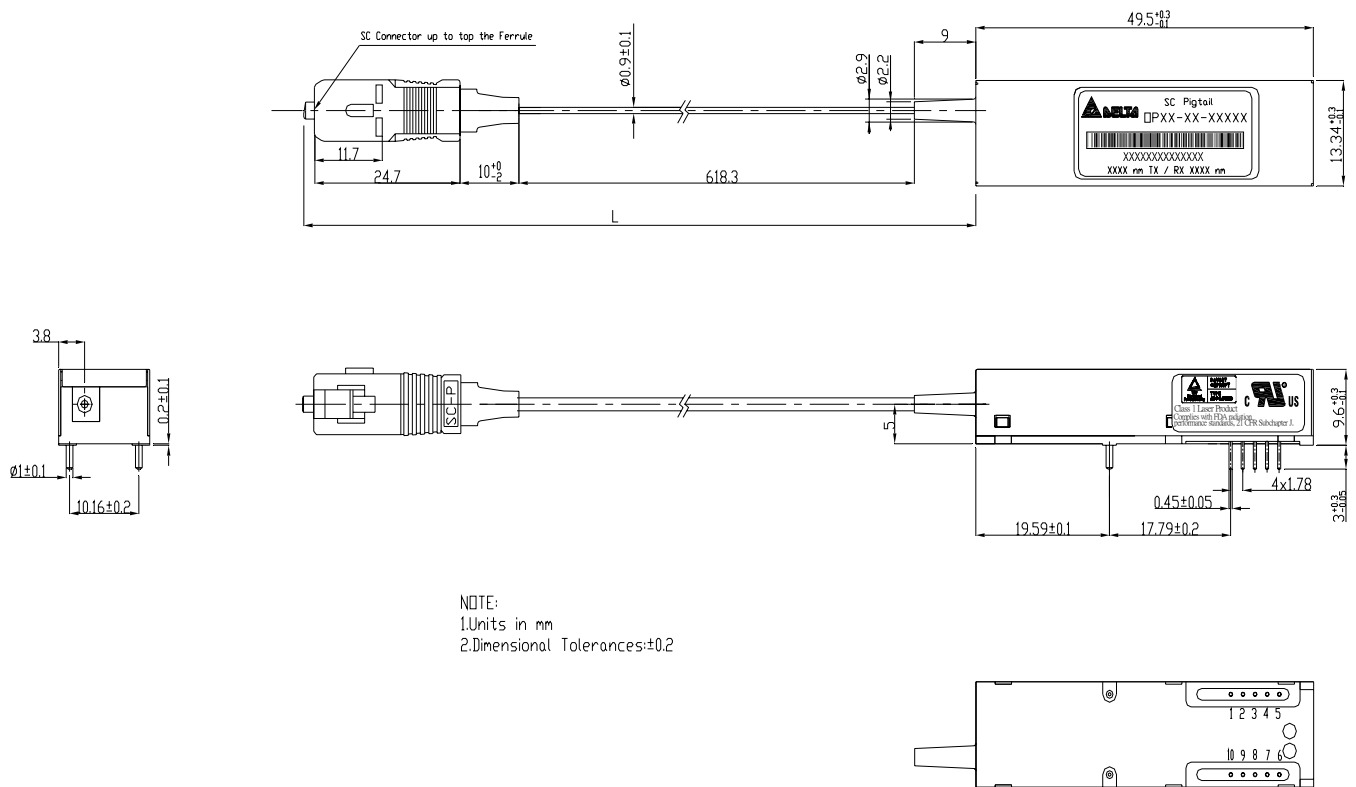


8. Recommended Interface Circuit

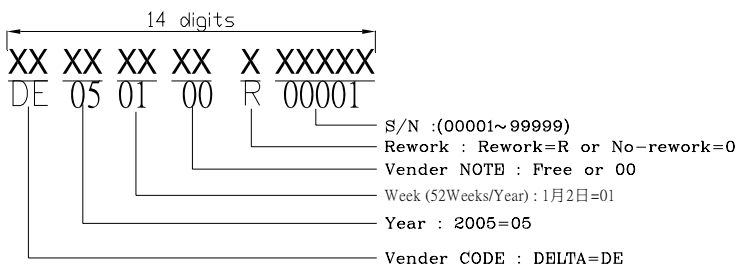


9. Outline Dimensions

Parameter	Unit	Description	Note
Mechanical Dimensions	mm	49.5x13.34x9.6	
Connector Type	-	SC/APC Cone type connector	
Minimum Fiber Bending Radius	mm	20	
Maximum Fiber Contact Temperature	°C	85	
Tensile Force on Pigtail	Kg	1	
Maximum Fiber Stress Allowance	kpsi	200	
Fiber length (L)	mm	664.3±10	



S/ N



10. Regulatory Compliance

Feature	Test Method	Reference	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	Human Body Model (HBM)	MIL-STD-883E Method 3015.7 EIA-JESD22-A114	(1) Satisfied with electrical characteristics of product spec.
	Machine Model (MM)	EIA-JESD22-A115	
Electrostatic Discharge (ESD) to the Simplex Receptacle	Contact Discharge	IEC/EN 61000-4-2	(2) No physical damage
	Air Discharge	IEC/EN 61000-4-2	
Radio Frequency Electromagnetic Field Immunity		IEC/EN 61000-4-3	
Electromagnetic Interference (EMI)		FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	
Laser Eye Safety	FDA/CDRH	FDA 21CFR 1040.10, 1040.11	CDRH File # 0420993
	TUV	IEC/EN 60825-1 IEC/EN 60825-2	TUV Certificate # R50032471
Component Recognition	TUV	IEC/EN 60950	
	UL/CSA	UL 60950	UL File # E239394

Appendix A. Document Revision

Version No.	Date	Description
S0	2006-06-27	Preliminary datasheet
S1	2006-09-20	Update recommended interface circuit and SD level
S2	2006-12-26	Update fiber pigtail length and product picture